REMARKS

The Office Action of October 1, 2008 has been reviewed and the Examiner's comments carefully considered. Claims 13-30 are pending in this application, and claim 13 is in independent form. Claims 13-30 are rejected under 35 U.S.C. §103(a) for obviousness over United States Patent No. 5,289,867 to Barker et al. (hereinafter "the Barker patent") in view of United States Patent No. 5,770,832 to Carnes et al. (hereinafter "the Carnes patent").

As defined by independent claim 13, the present invention is directed to a system for on-line prediction of mechanical property characteristics for hot rolled coils in a hot strip mill. The system includes a unit providing data on a rolling schedule in addition to chemistry regarding the product in the steel making stage. The system also includes field devices for obtaining real-time measuring parameters of the hot rolled coils during the rolling process. The data from the field devices is captured and converted using segment tracking from time domain data to space domain data. The system further includes a computation module that processes all data and predicts mechanical properties of the hot rolled coils, the properties along the length and through the thickness of the strip being rolled. The predicted mechanical properties are sent to a unit for use during production planning and scheduling.

The Barker patent refers to the cooling of a continuously rolled rod. The rod is going from liquid phase to solid phase during a cooling process. The Barker patent discloses a rod manufacturing apparatus including a continuous casting machine (10), a multiple stand rolling mill (11), and a quenching apparatus (12). The Barker patent discusses a process where nozzle spray loops are controlled by a computer during the rolling stage only for a continuous cast bar. The operating mechanism depends on a series of historical data stored as a function of cast bar chemistry, cast bar solidification temperature, and flow rates. The data is stored as distinct field entries so that a particular flow rate corresponds to a particular solidification temperature. Interpretation between flow rates is achieved through regression analysis done off-line, having a dependent cast bar property for temperature and an independent property for the flow measure ends.

Accordingly, the Barker patent does not teach or suggest a system for on-line display of property prediction for hot rolled coils in a hot strip mill comprising a unit for providing data on a rolling schedule chemistry in the steel making stage. Instead, the Barker patent requires a continuous cast process and more specifically requires the use of

solidification of liquid metal cooling to achieve a solidification temperature for a cast rod. Therefore, Applicant believes the Barker patent does not teach any of the elements of the present invention since it does not teach or suggest hot rolled coils.

Further, Applicant believes that the Barker patent does not disclose a process for use through a multiple stand rolling mill. The only property required by the Barker patent is the temperature of the bar at which the solidification occurs, which is a function of the cooling rate and chemistry of the continuous cast process not the rolling mill. In addition, the Barker patent fails to teach or suggest field devices for measuring process parameters during hot rolling as required by claim 13 of the present invention. In the Barker patent, the values corresponding to a particular physical property, for example, tensile strength, and the values corresponding to actual flow rate monitored by the programmable logic controller, are calculated discretely for each nozzle in the continuous cast process. Therefore, the Barker patent does not teach capturing any physical property of the rolling mill. During the cooling process, the only physical property captured is the cast bar temperature after the bar has exited the continuous cast process, which is not a physical property measured in the present invention. In contrast, the present application has instrumentation and field devices as shown in Fig. 3 of the current application (FD1-FDN) which obtain real-time process related data. The mechanical properties yield strength (YS), ultimate tensile strength (UTS), and percentage elongation (EL) are measured over the length and through the thickness of the coil. They are displayed on a display unit and for every coil various positions of the strip as shown in Fig. 4 of the present application. Such an on-line prediction system helps the rolling mill operator take corrective action to get nearly uniform mechanical properties along the length of the strip. This data is then sent to a computation module for processing.

Still further, the Barker patent does not teach or suggest the use of data for prediction of physical properties nor does it teach or suggest a computation module for converting data for predicting mechanical properties. As discussed previously, the Barker patent does not suggest any on-line prediction during the cooling process. Any calculations the Barker patent performs are obtained off-line during simulations (see Barker, page 14, lines 67-68). In the present invention, the on-line system predicts coil temperature simultaneously over the entire length of the coil. The Ferrite grain size variation over the length of the coil is also shown. Further, the present invention predicts the amount of aluminum and nitrogen in solid solution over the length of the coil. This information helps

for corrective actions in processing. Still further, the present invention predicts aluminum and nitrogen in solution, yield strength, ultimate tensile strength, and percent elongation not only along the length but also through the thickness at three different locations – center, surface, and quarter thickness. The Barker patent does not teach or suggest predicting physical properties of the cast bar.

With regard to the Barker patent teaching a system predicting results (see the Barker patent, column 13, lines 62 to column 14, line 4), the cited passage only discusses off-line inputs into the system from the customer using specification data or cast bar data. As stated in the Barker patent, the passage referring to the word "predict" describes a setting passed into the system to obtain a desired cast bar characteristic and not a prediction about the mechanical properties as required in independent claim 13 in the present invention.

With regard to the Carnes patent, a system and method for determining a cooling rate for a metal alloy type is disclosed with relation only to a pulse welding system. The Carnes patent further teaches development of properties within a weld zone electrical resistance welding process. Applicant believes both the properties required for the electrical resistance welding process and those properties developed during the electrical resistance welding process are distinctly different from strip rolling.

As set forth in MPEP §2143.03, to establish *prima facie* obviousness of a claimed invention, all of the claim limitations must be considered in judging patentability of a claim against the prior art. Where claimed limitations are simply not present in the prior art, a *prima facie* rejection is not supported unless clear articulation is given as to why the differences between the prior art and the claimed invention would have been obvious to one of ordinary skill in the art. The Office Action in the present case provides no reasoning as to why the differences between the prior art and the present invention would have been obvious.

First, because of the differences between the electrical resistance welding process and the strip rolling process, the teachings of the Carnes patent are irrelevant to the claimed features in the present invention. Combining the Barker patent and the Carnes patent would result in an inoperable system since the Carnes patent teachings are only applicable to electrical resistance welding processes.

Second, the Barker patent neither teaches nor suggests an on-line property prediction system for hot rolled coils having a unit for providing data on a rolling schedule, a field device for measuring process parameters during hot rolling, a controller for requiring

data of measured parameters, means for converting the measured data from time domain to space domain using segment tracking, and a computation module for processing the converted data for predicting mechanical properties along the length and through the thickness of the strip being rolled as required by claim 13. Assuming arguendo that the Carnes patent could be applied, the Carnes patent still fails to cure the many deficiencies as discussed above with regard to the Barker patent. Therefore, a *prima facie* case of obviousness has not been established.

For the reasons stated hereinabove, Applicant believes that the subject matter of independent claim 13 is neither taught nor suggested by the Barker patent or the Carnes patent. Reconsideration of the rejection of claim 13 is therefore respectfully requested.

Claims 14-17, 23-25, and 27-30 depend from and add further limitations to independent claim 13 and are believed to be allowable for the reasons discussed hereinabove in connection to independent claim 13. Reconsideration of the rejection of claims 14-17, 23-25, and 27-30 is respectfully requested.

With regard to claims 18 and 26, neither the Barker patent nor the Carnes patent teaches or suggests a deformation sub-module as required by claims 18 and 26. In addition, claims 18 and 26 are believed allowable for the reasons stated hereinabove with regard to independent claim 13.

With regard to claim 19, neither the Barker patent nor the Carnes patent teaches or suggests a thermal sub-module as required by claim 19. In addition, claim 19 is believed allowable for the reasons stated hereinabove with regard to independent claim 13.

With regard to claim 20, neither the Barker patent nor the Carnes patent teaches or suggests a micro-structural sub-module as required by claim 20. In addition, claim 20 is believed allowable for the reasons stated hereinabove with regard to independent claim 13.

With regard to claim 21, neither the Barker patent nor the Carnes patent teaches or suggests a precipitation sub-module as required by claim 21. In addition, claim 21 is believed allowable for the reasons stated hereinabove with regard to independent claim 13.

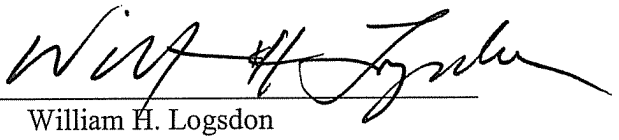
With regard to claim 22, neither the Barker patent nor the Carnes patent teaches or suggests a property prediction sub-module as required by claim 22. In addition, claim 22 is believed allowable for the reasons stated hereinabove with regard to independent claim 13.

Conclusion

For the reasons set forth above, Applicant believes claims 13-30 are patentable over the cited art and are in condition for allowance. Reversal of all of the Examiner's rejections and allowance of these claims are respectfully requested. To the extent the Examiner maintains these rejections in view of the arguments and discussion presented above, Applicant specifically requests an interview with the Examiner to discuss this matter, and Applicant's position to move this case towards allowance.

Respectfully submitted,

THE WEBB LAW FIRM

By 

William H. Logsdon
Registration No. 22132
Attorney for Applicant
436 Seventh Avenue
700 Koppers Building
Pittsburgh, PA 15219
Telephone: (412) 471-8815
Facsimile: (412) 471-4094
E-mail: webblaw@webblaw.com